

DUISTERS – U.S. Pat. Appln. No. 10/807,408
Attorney Docket No.: 081468/0308928

- Amendment Under §1.116 -

IN THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. *(Currently Amended)* A lithographic optical system, comprising:
a first housing including a first chamber, a first optically transmissive window, a second optically transmissive window, and at least one moveable lens positioned inside said first chamber ~~in which the movement of the moveable lens within the first chamber is contactlessly guided by at least one gas bearing~~, and a linear motor and at least one gas bearing within the first chamber for contactlessly moving the moveable lens;
at least one gas exchange opening in communication with said first chamber;
and
at least one additional optical element positioned outside said first housing,
wherein an optical path is defined by said first optically transmissive window, said second optically transmissive window, said at least one moveable lens, and said at least one additional optical element.
2. *(Original)* The lithographic optical system according to claim 1, constructed and arranged to receive radiation and convert said radiation into a beam of radiation for illuminating a patterning device.
3. *(Original)* The lithographic optical system according to claim 1, constructed and arranged for receiving a patterned beam of radiation and for projecting said patterned beam of radiation onto a substrate.
4. *(Original)* The lithographic optical system according to claim 1, wherein said at least one additional optical element comprises one of a blind, a filter, a mirror, and a lens.

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5. *(Original)* The lithographic optical system according to claim 1, comprising a plurality of additional optical elements positioned outside of said first housing.

6. *(Original)* The lithographic optical system according to claim 1, wherein said moveable lens is a composite lens comprising a plurality of lens elements, at least one of which is moveable in the first chamber.

7. *(Original)* The lithographic optical system according to claim 1, wherein only said at least one moveable lens is a moveable part in said first chamber.

8. *(Original)* The lithographic optical system according to claim 1, wherein said at least one moveable lens is the only optical element in said first chamber.

9. *(Original)* The lithographic optical system according to claim 1, further comprising first gas exchange means connected to said at least one gas exchange opening.

10. *(Original)* The lithographic optical system according to claim 9, wherein said first gas exchange means comprises at least one of a pump and a container with a gas.

11. *(Original)* The lithographic optical system according to claim 1, wherein the at least one gas exchange opening is scalable.

12. *(Original)* The lithographic optical system according to claim 1, wherein the at least one gas exchange opening comprises a gas supply opening and a gas exhaust opening.

13. *(Cancelled)*.

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14. (*Previously Presented*) The lithographic optical system according to claim 1, wherein said moveable lens is coupled to a gravity compensator comprising a piston which is moveable in a cylinder with pressurizable gas.

15. (*Original*) The lithographic optical system according to claim 1, comprising at least one second housing, with a second chamber inside said second housing and with a third and fourth optically transmissive window and accommodating at least one of said at least one additional optical element in said second chamber.

16. (*Original*) The lithographic optical system according to claim 15, wherein said at least one second housing comprises at least one gas exchange opening in communication with said second chamber.

17. (*Original*) The lithographic optical system according to claim 16, wherein said at least one gas exchange opening is sealable.

18. (*Original*) The lithographic optical system according to claim 16, further comprising second gas exchange means connected to said gas exchange opening.

19. (*Original*) The lithographic optical system according to claim 15, wherein said first housing is releasably connected to at least one second housing.

20. (*Original*) The lithographic optical system according to claim 19, wherein one of said optically transmissive windows of said first housing and one of said optically transmissive windows of said at least one second housing form a common optically transmissive window.

21. (*Cancelled*).

22. (*Currently Amended*) The lithographic optical system according to claim 21, wherein said ~~lens-actuator comprises a~~ linear motor includes a magnet part and a

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conductor part, wherein said movable lens is connected to one of said conductor part and said magnet part.

23. (*Original*) The lithographic optical system according to claim 22, wherein said moveable lens is connected to said magnet part provided in said first chamber, wherein the conductor part is provided outside the first housing.

24. (*Currently Amended*) The lithographic optical system according to claim 18 ~~22~~, wherein at least one of said magnet part and said conductor part is coated with an outgassing-prevention coating.

25. (*Currently Amended*) A lithographic optical system, comprising:

a first housing including a first chamber inside said first housing, a radiation source, a first optically transmissive window, and at least one moveable lens in said first chamber, and a linear motor and at least one gas bearing within the first chamber for contactlessly moving the moveable lens;

at least one gas exchange opening in communication with said first chamber;
and

at least one additional optical element positioned outside said first housing, wherein an optical path is defined by said radiation source of radiation, said at least one moveable lens, said first optically transmissive window, and said at least one additional optical element.

26. (*Original*) The optical system according to claim 25, constructed and arranged for providing a beam of radiation for illuminating a patterning device.

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27. (*Currently Amended*) A lithographic apparatus, comprising:

(a) a radiation system configured to provide a beam of radiation, said radiation system including:

(i) a first housing including a first chamber, a first optically transmissive window, a second optically transmissive window, and at least one moveable lens positioned inside said first chamber ~~in which the movement of the moveable lens within the first chamber is contactlessly guided by at least one gas bearing~~, and a linear motor and at least one gas bearing within the first chamber for contactlessly moving the moveable lens,

(ii) at least one gas exchange opening in communication with said first chamber, and

(iii) at least one additional optical element positioned outside said first housing, wherein an optical path is defined by said first optically transmissive window, said second optically transmissive window, said at least one moveable lens, and said at least one additional optical element;

(b) a support structure configured to support a patterning device that imparts a desired pattern onto said beam of radiation;

(c) a substrate holder configured to hold a substrate; and

(d) projection system configured to project said patterned beam onto a target portion of said substrate.

28. (*Original*) The lithographic apparatus according to claim 27, wherein, with respect to said optical path, said optical system and said at least one additional optical element are positioned on a same side of said support structure.

29. (*Currently Amended*) A lithographic apparatus, comprising:

(a) a radiation system configured to provide a beam of radiation, said radiation system including:

(i) a first housing including a first chamber inside said first housing, a radiation source, a first optically transmissive window, and at least one

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moveable lens in said first chamber, and a linear motor and at least one gas bearing within the first chamber for contactlessly moving the moveable lens,

(ii) at least one gas exchange opening in communication with said first chamber, and

(iii) at least one additional optical element positioned outside said first housing, wherein an optical path is defined by said radiation source of radiation, said at least one moveable lens, said first optically transmissive window, and said at least one additional optical element;

(b) a support structure configured to support a patterning device that imparts a desired pattern onto said beam of radiation;

(c) a substrate holder configured to hold a substrate; and

(d) a projection system configured to project said patterned beam onto a target portion of said substrate.

30. *(Original)* The lithographic apparatus according to claim 29, wherein, with respect to said optical path, said optical system and said at least one additional optical element are positioned on a same side of said support structure.

31. *(Currently Amended)* A lithographic apparatus, comprising:

(a) a radiation system configured to provide a beam of radiation, said radiation system including:

(i) a support structure configured to support a patterning device that imparts a desired pattern onto said beam of radiation;

(ii) a substrate holder configured to hold a substrate; and

(b) a projection system configured to project said patterned beam onto a target portion of said substrate, said projection system comprising,

(i) a first housing including a first chamber, a first optically transmissive window, a second optically transmissive window, ~~and at least one moveable lens positioned inside said first chamber in which the movement of the moveable lens within the first chamber is contactlessly guided by at least one~~

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gas bearing, and a linear motor and at least one gas bearing within the first chamber for contactlessly moving the moveable lens.

(ii) at least one gas exchange opening in communication with said first chamber, and

(iii) at least one additional optical element positioned outside said first housing,

wherein an optical path is defined by said first optically transmissive window, said second optically transmissive window, said at least one moveable lens, and said at least one additional optical element.

32. (*Original*) The lithographic projection apparatus according to claim 31, wherein said at least one additional optical element is positioned between said support structure and said substrate holder.